



# Tax competition with heterogeneous capital mobility<sup>☆</sup>

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## ABSTRACT

An ongoing debate in the tax competition literature is whether a system of countries or regions should restrict the preferential tax treatment of different types of firms or capital. We further investigate this issue by departing from the bulk of the literature in three ways: (1) rather than maximize only tax revenue, governments also put positive weight on the income generated by resident-owned firms; (2) under preferential taxation, firms are distinguished by their country of origin; and (3) the competing regions are allowed to differ in size. Under the assumption of uniformly-distributed moving costs, identical regions always prefer the non-preferential regime. But when a small and large region compete, the small region prefers the preferential regime in some cases. We also identify non-uniform distributions of moving costs where the preferential regime is preferred by identical competing regions. This finding is related to differences in tax-base elasticities.

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## 1. Introduction

A controversial issue in the study of tax competition is whether it is desirable for countries or regions to agree not to provide preferential treatment to different forms of capital. The common view is that without such restrictions, countries will aggressively compete for capital that is relatively mobile across different locations, resulting in taxes that are far below their desirable levels. By eliminating such preferential treatment, no capital will be taxed at very low rates, because doing so would sacrifice too much tax revenue from the relatively immobile capital. But this solution is not without cost: in an attempt to attract mobile capital, governments can

be expected to reduce the common tax rate below the tax at which relatively immobile capital would be taxed in the preferential case. In an important paper, Keen (2001) analyzes this tradeoff using a model in which two identical regions compete over two tax bases that exhibit different degrees of mobility. He finds that governments raise more revenue when the more mobile tax base gets preferential treatment. But the literature also contains models, beginning with Janeba and Peters (1999), where the non-preferential regime raises more revenue. In contrast to Keen, the Janeba-Peters model exhibits an infinite elasticity of the mobile tax base with respect to cross-country differences in tax rates, and the importance of this tax-base elasticity is also apparent in subsequent papers.<sup>1</sup> In particular, the desirability of the preferential regime appears to depend strongly on tax bases not being highly elastic.

Using a model that departs from the standard models in important ways, we obtain the opposite result. Moreover, we later extend the analysis by not only providing a welfare-ranking of the preferential and non-preferential regimes, but also identifying cases

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<sup>1</sup> See Wilson (2005), Konrad (2008), and Marceau et al. (2010). Janeba and Smart (2003) investigate a more general model than is typically found in the literature on tax-base discrimination, allowing them to relate the comparison of the two regimes not only to how the tax bases respond to differences in tax rates across regions, but also to how these tax bases respond to a uniform increase in both regions' tax rates.

where the welfare-maximizing regime is actually the equilibrium for a multi-stage Nash game, where regions unilaterally commit to a regime in the initial stage of the game.

One point of departure with past literature is shared by Haupt and Peters (2005). They introduce a preference for investing in the home country, referred to as “home bias,” and show that non-preferential regimes lead to higher tax revenue. This home bias is modeled by distinguishing between investments by domestic residents and investments by foreigners. Similarly, we distinguish between domestic and foreign firms, but we fill in the micro-foundations for the home bias effect by assuming that firms differ in their cost of relocating from one region to another. In doing so, we are able to demonstrate how the ranking of the two regimes depends critically on the distribution of moving costs.

In our 2-region model, each region initially possesses a stock of domestic firms, which must incur a cost to relocate to the other region. The foreign firms that the region seeks to attract are the other region’s domestic firms. Under a non-preferential regime, the two regions play a Nash game in a single tax rate, which is levied on the profits of both domestic and foreign firms. With preferential treatment, however, the Nash game is in two tax rates, one for domestic firms and the other for foreign firms. Whereas all of the literature cited above assumes that regions choose their tax rates to maximize tax revenue, we instead take the more balanced view that regions also care about the “surplus” obtained in the private sector.<sup>2</sup> Finally, we depart from Haupt-Peters and much of the literature by devoting considerable attention to cases where regions differ in size. To obtain a pure-strategy equilibrium in tax rates, Janeba and Peters (1999) must assume sufficiently-large regional differences in the relation between tax revenue and tax rates. In contrast, we are able to show that any size differences lead to lower tax rates for the non-preferential regime, but not for the preferential regime. The small region may prefer the preferential regime, but only when it places a sufficiently large welfare weight on private surplus, relative to tax revenue.

In the case of uniformly-distributed moving costs and identical regions, we not only find that the non-preferential regime is preferred, but we are also able to quantify how much more tax revenue it raises. If we further specialize the model by assuming revenue-maximizing regions, this difference in revenues becomes very large. However, it declines when private surplus receives significant weight in the regional objective function.

Perhaps our most surprising finding involves the conditions under which the preferential regime is preferred, as in Keen (2001) but in contrast to Haupt and Peters (2005). The main surprise is that these conditions are not that tax bases are sufficiently inelastic with respect to interregional differences in tax rates, but that the tax bases are sufficiently *elastic*. This result is proved for the case of two identical regions. The preferential regime turns out to be preferable when there are a large number of firms with low moving costs, implying that these firms are highly responsive to small differences in tax rates between regions. In the non-preferential case, both regions set the same tax rates in the Nash equilibrium, so no firm moves in equilibrium. However, each region has a large incentive to reduce its tax rate by a small amount, since it can then obtain the large number of firms with low moving costs; that is, the tax-base elasticity is high. This undercutting drives down the common equilibrium tax rate. In contrast, a significant number of firms move between regions in the equilibrium for the preferential case, because each region has an incentive to set its rate on foreign firms discretely below the tax rate

on its domestic firms, in an effort to induce some foreign firms to operate within its borders. Thus, the marginal firm is no longer a firm with small moving costs. Without a relatively large number of firms at the margin, there is less downward pressure on tax rates in the preferential case. A crucial insight here is that the relevant responsiveness of firms to small changes in tax rates from their equilibrium levels can differ significantly between the two tax regimes.

From a policy perspective, these results call into question the view that preferential tax treatment of particular types of firms or capital should be limited as a result of the increasing integration of the world economy, given that this integration includes lots of firms with low moving costs. This may partially explain why there continue to be numerous examples of preferential treatment of foreign firms, though we later discuss the commitment problems involved in maintaining a non-preferential regime. These examples take many forms.<sup>3</sup> The most obvious one is the reduced rates on FDI, like those offered in Hong Kong, Indonesia, Ireland, Laos, Cambodia and Estonia, to name a few. It could also take the form of tax holidays (Israel, Malaysia, Singapore, Vietnam and more), accelerated depreciation (Algeria, Egypt, Morocco, Saudi Arabia, Tunisia and more), or investment tax credits (India, Nigeria, Pakistan, South Africa, Turkey and more).

Using a model that is similar to our model and the Haupt-Peters model, Niu (2017) also describes cases where the preferential regime is desirable. But he departs from our model by allowing profits to differ across both firms and regions, whereas moving costs are homogenous. This specification creates the type of “tax base expansion effect” that is emphasized by Janeba and Smart (2003), under which restrictions on tax preferences may be welfare-worsening because they reduce the overall tax base. In Niu (2017)’s model, this effect is more prominent when there are large productivity and size differences between regions. Although the generality of the model rules out analytical results, Niu is able to show numerically that the preferential regime dominates in these cases of large regional asymmetries.

In both our paper and Niu, size differences are measured by the number of initial domestic firms. But our assumption that private surplus receives weight in regional welfare functions limits the desirability of high tax rates, since the additional tax revenue comes at the expense of lower private surplus.

The plan of this paper is as follows. In the next section, we describe the basic features of the model. Section 3 then analyzes the case where the distribution of moving costs is uniform, which includes the analysis of size asymmetries. Similar assumptions are employed by Kanbur and Keen (1993) to study competition for cross-border shoppers. In their model, our moving costs become travel cost to the border. Keen and Konrad (2013) use a similar model to study profit-shifting by multinationals. But neither paper analyzes preferential tax regimes, and both papers assume tax revenue maximization. Trandel (1994) and Haufler (1996) consider welfare maximization in the context of commodity taxation and cross border shopping. In Trandel (1994), the less populated region sets a lower tax rate, which is similar to our results about regional sizes. In Haufler (1996), the small region may not gain from tax harmonization. In our paper, the small region may not gain from restricting preferential tax treatment. Those two papers, do not consider discrimination, but other articles on cross-border shopping do so, as discussed in our concluding section.

Section 4 studies non-uniform distributions of moving costs, which provides insights into the relation between tax base elasticities and the welfare comparison between tax regimes.

Throughout the preceding analysis, we assume that the two regions are able to commit to a non-preferential regime if doing so

<sup>2</sup> Janeba and Smart (2003) assume tax revenue maximization for their main analysis, but they do generalize the model by allowing welfare to depend on both tax revenue and consumer surplus. They conclude that this extension does not alter the main results and, in some cases, reinforces them.

<sup>3</sup> For more details, refer to United Nations (2000) and to OECD (2007).

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